

## Bubble Removal from Photoresist using SuperPhobic<sup>®</sup> Contactors Does Away with Down-Time at Semiconductor Site

A semiconductor manufacturer has successfully removed the down time that they used to experience due to problems with bubble formation in their photoresist solution. This company mixes their own photoresist. Historically, they used to let the tank vent to the atmosphere for 4-5 hours and wait for the bubbles to come to the surface. The difficulty with simply venting the excess gas is that the photoresist solution is still saturated with gases at the conditions where the solution was vented. Any further pressure reductions and/or temperature increases will create additional bubbles. It also takes a long time to vent bubbles using the open tank method.

This customer now successfully uses a SuperPhobic<sup>®</sup> Membrane Contactor to remove the bubbles from their photoresist solution right after mixing it and immediately before applying it to their substrate. Placing a SuperPhobic Membrane Contactor inline eliminates any bubble formation.

### The Application Specifics

Photoresist with a viscosity of 20 cP at 100° F is run through a

SuperPhobic contactor at 5 gpm. A 27.5" Hg vacuum is used to lower the partial pressure of the gas phase inside of the contactor and create a driving force to remove the bubbles from the photoresist solution. The estimated bubble removal in one pass through the membrane contactor is 99% removal and there are no visual signs of any bubbles being present at the outlet of the contactor. The customer plans to increase the flow rate to 20 gpm in the future. The design of the contactor allows for changes in flow conditions without having to add additional equipment.

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**The customer stated, "Our only disappointment was that we didn't get to this sooner. I've spent many late nights trying to troubleshoot air bubbles in the photoresist. The contactor sold itself to management."**

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A polyolefin Hollow Fiber Membrane that does not wet out when put in contact with low

surface tension fluids provides the support medium and surface area allowing the gas and a liquid phase to come in direct contact with each other.

A vacuum phase is maintained on the lumenside (inside) of the hollow fibers while the liquid photoresist solution flows on the shellside (outside) of the hollow fibers. The vacuum creates a partial pressure differential inside of the lumens and the bubbles travel from the liquid phase through the pores of the membrane into the lumens. The vacuum then carries the bubbles out of the lumens and the solution is bubble free.

Many manufacturing processes, analytical measurements, and other industrial processes and procedures that involve aqueous based solutions, are adversely affected by bubbles in the fluid stream. SuperPhobic Membrane Contactors provide a very simple, cost effective solution to eliminate bubbles from the process.

For more information on bubble removal and our Membrane Contactors, please call us or visit our website at [www.liqui-cel.com](http://www.liqui-cel.com).

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